Statement of Work
For SEMS RACKS

Overview

The vendor shall provide all labor, materials, and assembly of 5 identical sets of equipment and their associated cables. Each of the 5 sets shall be configured in a standard 19" equipment rack. The Figure 1 shows the general configuration of the rack.

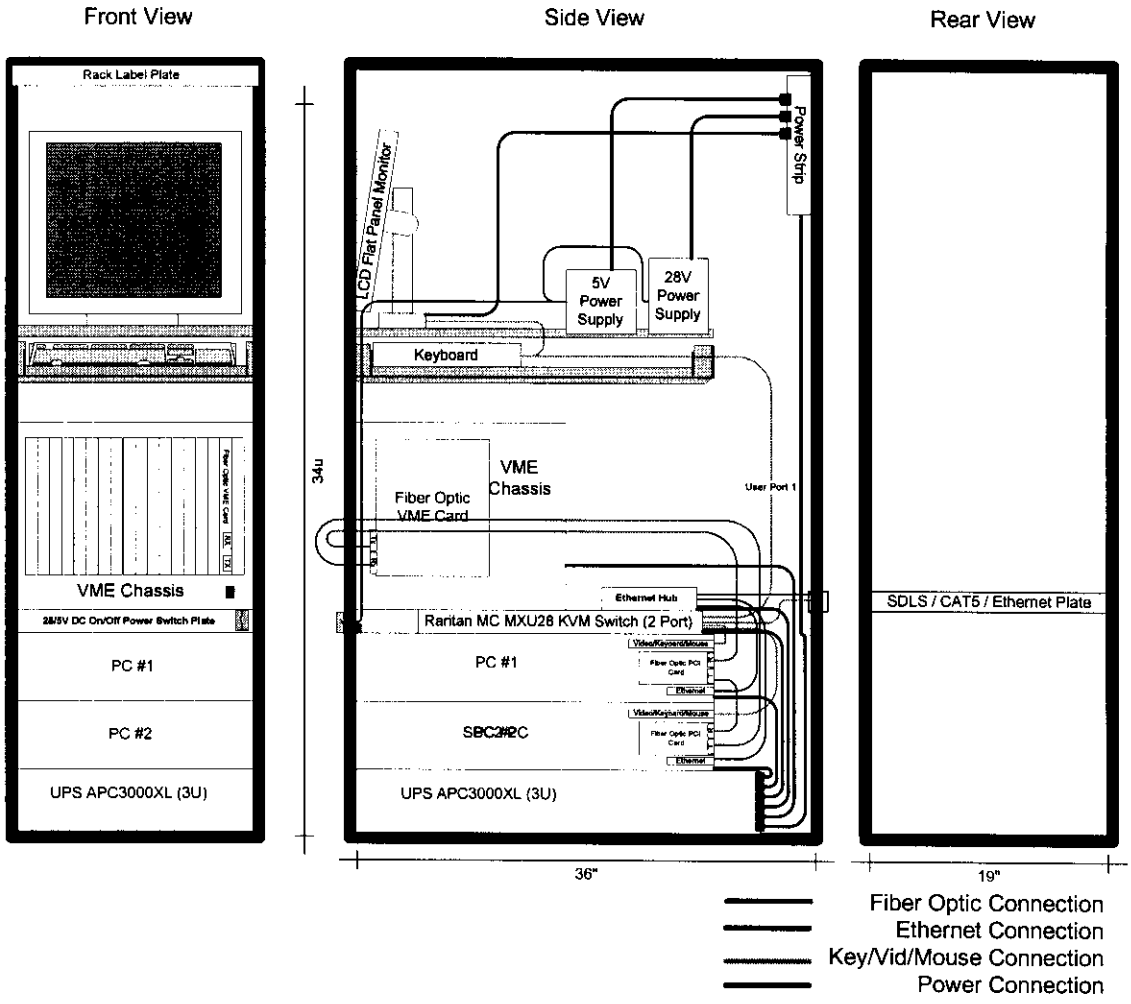


Figure 1. SEMS Rack Layout

Each 19" Equipment Rack shall contain the following items (see descriptions provided later in the document):

	DESCRIPTION	QUANTITY PER RACK
A	3U Rackmount PC	2
B	21 slot VME cage with 1000W Power Supply	1
C	3U Rack Mountable 3000W UPS	1
D	19" LCD Flat Panel Monitor	1
E	Drawer Mounted 104 Key Keyboard with touchpad	1
F	5 V DC 5A enclosed switching power supply	1
G	28 V DC 1.7A enclosed switching power supply	1
H	KVM Switch with cables for 2 PCs plus capability for a remote KVM input from 100ft away	1
I	KVM CAT5 Reach Port (with female-to-female rear panel feed-through)	1
J	Internal Power Strip with at least 6 outlets	1
K	Ethernet Hub 10/100Base-TX with minimum of 4 ports	1
L	CAT5e Ethernet Ports (with female-to-female rear panel feed-throughs)	2
M	DB-25 Female Connector for EIA-530 (connector is part of cable described below)	1
N	1U Front mounted panel with 1 toggle switch/circuit breaker and indicator light for use with the 2 DC Power Supplies	1
O	1U Rear SDLS/CAT5e Mounting Plate (see Figure 4)	1
P	2U Blank front mounted panel for a system name label	1
Q	12-position covered double-row terminal barrier strip	1
R	Shorting clip for terminal barrier strip	12
S	Crimp Spade lug for 16 AWG	110
T	Cable ties for harness organizing of discrete hook-up wire	50
U	8-pin DIP plastic commercial configuration PROM (ALTERA P/N: EPC1PC8) to be used by the end user with programmable Industry Pack modules	20

In support of these rack equipment items, the following cables shall be provided for each rack (see the descriptions provided later in the document):

	DESCRIPTION	LENGTH (INCHES)	QUANTITY PER RACK
V	50-conductor Twist & Flat cable with female connectors (see Custom Cable Harness section below - Cable A)	80	15
W	50-conductor flat cable with female connectors (see Custom Cable Harness section below - Cable B)	80	15
X	One custom cable harness made from (2) interconnected 50-conductor flat cables (see Custom Cable Harness section below - Cables C & D)	80	15
Y	Multimode ST to ST **duplex** fiber optic cable for network cards between PC and VME chassis	80	2

Z	Multimode ST to ST **duplex** fiber optic cable for cards between PCs	24	1
a	DB-25 Male to panel mounted DB-25 Female EIA-530 cable	72	1
b	DB-25 Male to DB-9 Female RS-232 Null Modem cable	72	2
c	RJ-45 CAT5e Male to Male cable for connection of PCs to Ethernet Hub	36	2
d	RJ-45 CAT5e Male to Male cable for connection of Ethernet hub to rear panel	36	2
e	RJ-45 CAT5e Male to Male cable for connection of Raritan Extended Reach Port to rear panel	36	1
f	1 spool each of 16 AWG multi-stranded single-conductor hook-up wire with 300V PVC in the following colors: Red, Orange, Black, Green, and White	50 foot	5 spools

Delivery Schedule

It is desired that one assembled rack and its associated cable set should be delivered by 15 April 2005 and no later than 25 April. The remaining 4 racks with their cables shall be delivered no later than 31 May 2005.

19" Equipment Rack Description

Each rack shall provided fully assembled with the following salient features:

a. Usable height of not less than 34U.
b. Usable depth of at least 30".
c. Vented top panel without forced ventilation.
d. Removable side panels.
e. Removable tinted transparent front door (not using glass).
f. No rear door shall be provided.
g. Front and rear vertical mounting rails shall be provided. The end user will add 4 rear-mounted connector mounting plates, each plate supporting 4 cables of 1-inch diameter.
h. 2 pair of adjustable vertical mounting rails shall be provided (one aligned at the rear of the VME chassis mounting and one aligned to the rear of the PC mounting slides).
i. Rack color will be matte black.
j. 4 heavy-duty casters shall be provided. The 2 front wheels shall swivel and be lockable. The 2 rear casters may be fixed for front-to-back motion.
k. Total height of the rack including the casters cannot exceed 76".
l. The rack must be constructed for heavy-duty (minimum of 14 gauge steel frame, 16 gauge side panels, and rails (2 pair included) are made of 12 gauge zinc plated steel), with a minimum capability of supporting 750 lbs of equipment.

Personal Computer Requirements

The 2 identical PCs in each rack shall each consist of the following features:

DESCRIPTION	PART NO.	QUANTITY PER PC
3U 19" Rackmount form factor extended ATX chassis with: • Rack-Mounting rails • 550W power supply • 8 SATA drive bays and carriers • 6 PCI expansion slots • 1 Floppy drive bay • 1 CDROM drive bay	SuperMicro SC832T-550 This item must not be substituted in order to retain parts interchange with existing systems	1
Extended ATX motherboard with: • Supports dual XEON processors with 1 MB integrated transfer cache up to 3.2 GHz • Intel E7501 Chipset • 533/400 MHz system bus • 3 64-bit PCI-X slots • 3 32-bit 33 MHz PCI slots • 8 SATA connectors and cables • 1 Gigabit Ethernet, 10/100M Ethernet • Onboard Video Controller • PS/2 keyboard output • PS/2 mouse output	SuperMicro X5DPL-TGM This item must not be substituted in order to retain software compatibility with existing systems. A real-time operating system (purchased separately) requires the features of this motherboard.	1
Intel XEON PIV 3.06 GHz processor	Intel BX80532KE3066E	2
256 MB PC2100 ECC DIMM DDR Registered	any reasonable source	2
120 GB Serial ATA Hard Drive 7200 RPM	any reasonable source	2
Internal DVD +/-R/RW/CDRW Drive Burner with 24" EIDE 3 cable	any reasonable source	1
Floppy Drive: 1.44 MB 3.5" with cable	any reasonable source	1
Windows 2000 Professional Operating System	any reasonable source	1

VME Chassis Requirements

DESCRIPTION	PART NO.	QUANTITY PER RACK
21J1/21J2 slot 6U card cage VMExcel Backplane with automatic daisy chaining	N/A	1
1000W power supply	N/A	1
Cooling fans for the cage with front and rear ventilation	N/A	1
No peripheral mounting capability is to be supplied	N/A	1
A full cage-top sized cable support plate held 1 inch above the top of the cage (to support 64 flat cables and allow cage ventilation air flow)	N/A	1

The recommended VME chassis from APW is P/N: PV2121ED160015CT. Equivalents are acceptable.

The chassis shall provide a setback of at least 2 inches between the rack mounting points and the front of the card slots. The power switch shall be mounted on the front of VME chassis so that it is accessible for a user standing in the front of the rack.

When this chassis is placed in service by the end user, 16 sets of 4 flat cables will be attached to 16 cards in the chassis. These 64 flat cables will be routed up and over the chassis for connection to electronics mounted on panels at the rear of the equipment rack. In order to allow proper heat exhausting from the chassis these cables must be held 1 inch above the top of the chassis. A simple 1/8-inch plate mounted on 1-inch spacers will achieve this requirement. Only minimal anchoring to the chassis should be necessary.

Uninterruptible Power Supply Requirements

A 3000KVA UPS shall be located at the bottom of each equipment rack. An American Power Conversions (APC) 3U UPS P/N: SU3000RMXL3U or equivalent is recommended. The 30 amp-rated power input cable of this unit shall be the rack's external power connection. Input power shall be single phase, 120 VAC/60 Hz. A 3-contact twist-lock connector (NEMA L5-30P) shall be used. At least 8 standard 120 VAC/60 Hz outputs shall be available. One output shall be dedicated to the rack's internal power strip. Only maintenance-free sealed Lead-Acid batteries shall be used.

19" Flat Panel LCD Monitor

A 19" flat panel LCD monitor shall be mounted on a shelf and located within 8 inches of the front equipment rack mounting rails. The LCD Monitor must be less than 19" in width in order to fit into the rack. The LCD Monitor shall have a resolution compatible with at least 1280X1024 or greater, with a refresh rate of 70 Hz or greater. The video I/O cable of the monitor shall be connected to the KVM Switch on the User 1 port.

Drawer Mounted Keyboard with Touchpad

A 1U or 2U drawer mounted keyboard of 104 keys with a touch pad and PS/2 connectors shall be mounted in the 19" rack directly beneath the flat panel monitor and connected to the KVM Switch User 1 port. An Adesso P/N 730PB-MRP with PS/2 connections is recommended.

KVM Switch and KVM Cable Requirements

Raritan Computer, Inc is the manufacturer of the following part numbers and must be used for compatibility and maintainability with existing systems. No equivalents can be accepted.

DESCRIPTION	RARITAN PART NO.	QUANTITY PER RACK
KVM switch with: • 2 1-user ports • 8-channel/ports access for PC connections • built-in extended access capability via CAT5 Reach Receiver • dedicated keyboard/mouse emulation • Part number includes Reach Receiver	MXU28G	1
19" 1U Rack mount kit for MXU28G with cable management	RMXU2-1U	1
Ultra Thin KVM Cables - for connecting each computer to MasterConsole model MXU2 (6.5 ft)	CCPT20	2
Ultra Thin KVM Cables for one PS/2 keyboard, PS/2 mouse, and VGA monitor; connect each user console to MasterConsole model MXU2 (6.5 ft)	CCPT20F	1

EIA-530 Serial I/O Cables

This cable should be made from flat cable and strain relieved insulation displacement connectors. A DB-25 Male shall be used at one end and a DB-25 Female at the other end. This female end will be mounted to the SDLS/CAT5 panel at the rear of the rack (See Figure 4).

DC Power Supplies

On the shelf behind the flat panel monitor, a pair of Switching DC Power Supplies shall be mounted.
These two supplies shall be convection cooled and shall each be fully enclosed for safety.
A single 120 VAC power feed shall operate both supplies.
Output ripple shall not exceed 0.2%.

One supply shall provide 5A at 5 VDC continuous duty with +/- 0.5 V adjustment.
Cosel P/N: R25A-5-N or equivalent is suggested.

The second supply shall provide 1.7A at 28 VDC continuous duty with adjustment up to at least 29 VDC.
Cosel P/N: P50E-30-N or equivalent is suggested. Note that this Cosel power supply is a 30V output adjustable down to 28V.

A single 12-position covered double-row terminal barrier strip mounted near the two supplies shall provide the connection points for end user addition of 4 cable harnesses of 3 conductors each: +5, GND, and +28 (see Figure 2). Spade lugs for 16 AWG shall be provided and will be used by the end user on the barrier strip. Shorting clips shall be

provided to group sets of four barrier positions. 50 cable ties per rack shall be provided in order to organize the sets of cables.

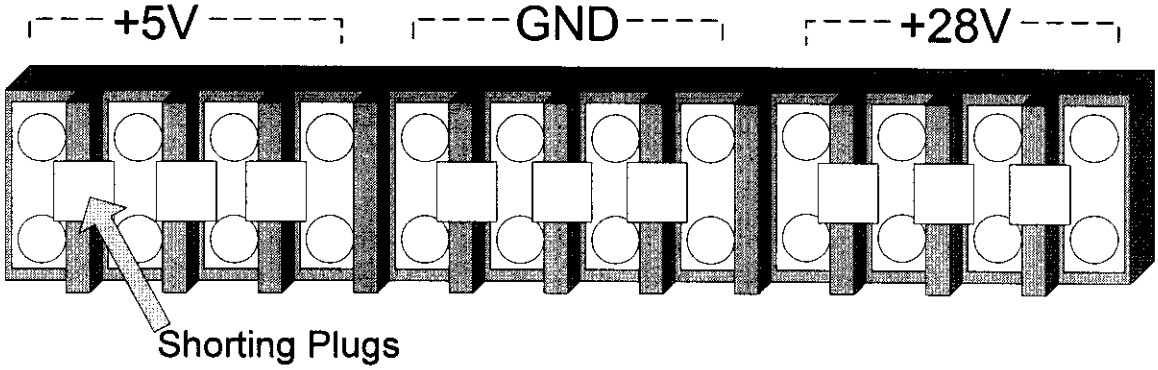


Figure 2. Terminal Barrier Strip Layout

Special Panels

Three special rack mounted panels shall be provided. All three panels shall be made from 0.125" aluminum and shall be epoxy powder painted matte black.

Front Power Control Panel

A 1U matte black panel shall be mounted between the upper PC and the VME chassis. About 2 to 3 inches from the right edge of the panel a thermal circuit breaker with rocker actuator / toggle switch rated at 1 to 1.5A and power-on indicator LED shall be mounted. This circuit breaker/toggle (or rocker) switch is to apply 120 VAC power to the pair of DC Power Supplies described above.
The 5 VDC output of one supply shall then be used to light the power-on LED.

System Name Plate Mounting Panel

A blank 2U matte black panel shall be provided at the top front of the rack's usable mounting space.
The end user will later attach an adhesive backed system name to this panel.

SDLS/CAT5e Mounting Panel

A 1U matte black rear-mounted panel shall be provided behind the VME chassis for the purpose of supporting multiple I/O ports. These shall include the mounting of one female DB-25 connector for EIA-530 I/O and mounting of three female-to-female panel feed-through CAT5e ports. Two of these CAT5e ports shall be connected to the Ethernet hub. The third CAT5e port is for connection of the Raritan CAT5 Extended Reach port. See Figure 4 below for panel layout.

Flat Cable Sets

Each of the 5 identical systems shall include 15 sets of 80" 28 AWG stranded flat cable assemblies consisting of two (2) single 50-conductor cables and one cable harness. All connectors shall be 0.10" x 0.10" wiremount 50-contact IDC socket connector type with center bump polarization (3-M P/N 3425-6650 or 3425-7600 or equivalent).

Single Flat Cables

One cable of each set shall be constructed using an 80" piece of Twist & Flat 50-conductor AWG 28 cable (3-M P/N 1700/50) which has a 20" repeating pattern of first 25 twisted pairs followed by a section of 50-conductor flat cable. A single socket connector shall be mounted on the flat cable at each end of the 80" cable. (See Figure 3) Mark this cable as A on each end.

A second cable of each set shall be similarly constructed using regular flat 50-conductor AWG 28 cable (3-M P/N 3365/50 or equivalent). (See Figure 3) Mark this cable as B on each end.

Custom Cable Harness

Each of the 15 custom cable harnesses shall be assembled as follows:

Begin with (2) 80-inch lengths of 50-conductor AWG 28 flat cable.
Mount a socket connector on one end of each cable.
Mark one cable as Cable C and the other as Cable D on each end.
At the unconnectorized end of Cable C, split the cable back about 8 inches between conductors 9 and 10. Then split the cable back about 8 inches between conductors 27 and 28. This creates a subcable of 9 conductors, a subcable of 18 conductors, and a subcable of the remaining 23 conductors.
At the unconnectorized end of Cable D, split the cable back about 8 inches between conductors 18 and 19. This creates a subcable of 18 conductors and a subcable of the remaining 32 conductors.

Now the cables will be made into a harness by interchanging their 18 conductor subcables.
Connectorize the end of the Cable D with a 50-contact IDC socket connector (with center bump polarization), but use the 18-conductor subcable of Cable C as the lower 18 contacts and use the upper 32 conductors of Cable D as the upper contacts. Be certain to retain the proper conductor numbering sequence (1 though 18 and 19 through 50).
Connectorize the end of Cable C with a 50-contact IDC socket connector (with center bump polarization), but use the 18-conductor subcable of Cable D with contacts 10 through 27 of the Cable C connector. Be certain to retain the proper conductor numbering sequence (1 though 9 - from Cable C, 1 through 18 of Cable D, and 27 through 50 from Cable C).

See Figure 3 for a pictorial representation of these previous steps.

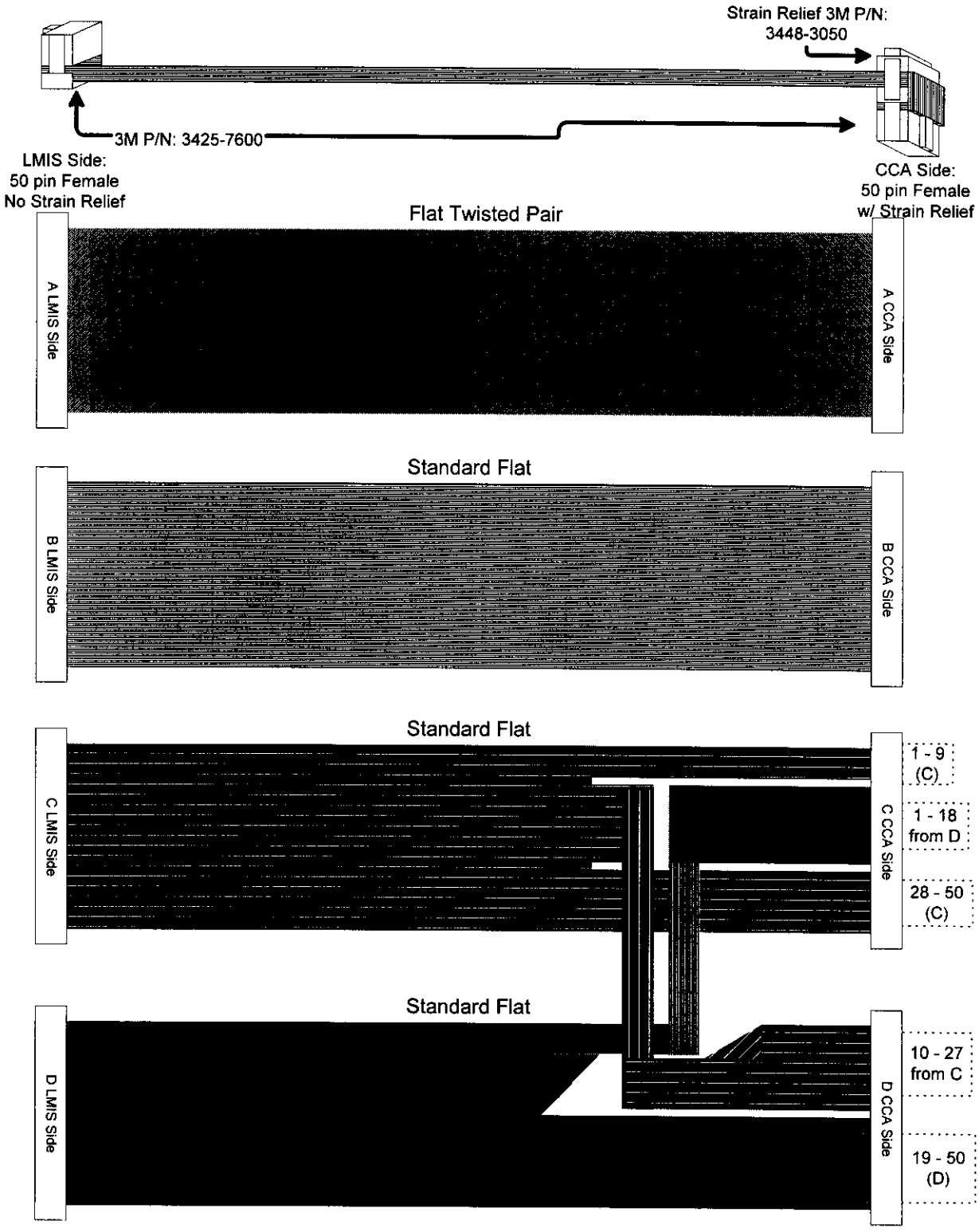
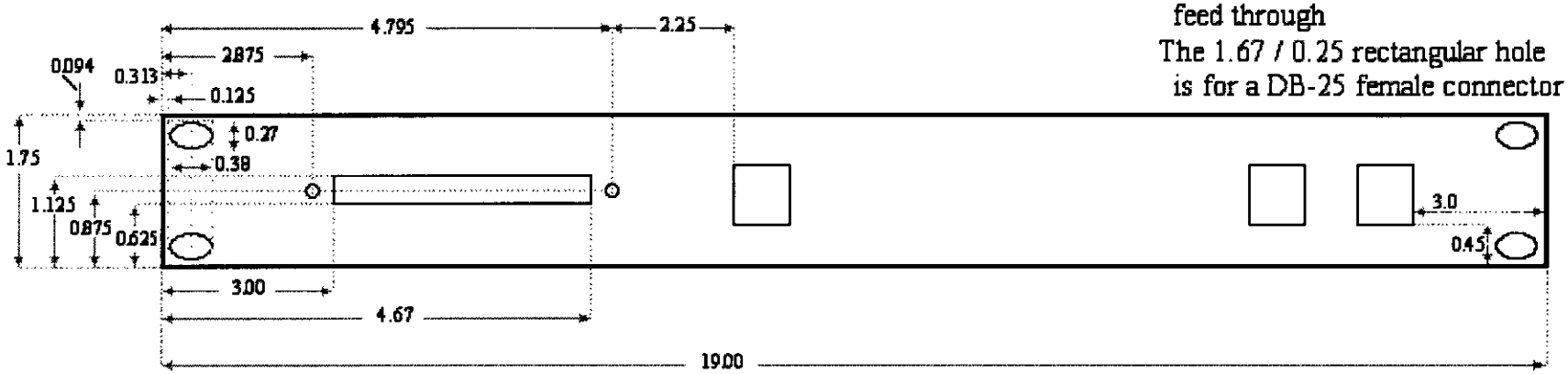


Figure 3. Ribbon Cable Layout

SDLS / CAT5 Connector Faceplate

Material: 0.125" Aluminum
All screw holes: 4-40 Tap
3 rectangular holes are for
CAT5e female to female panel
feed through
The 1.67 / 0.25 rectangular hole
is for a DB-25 female connector



For EIA-530 Connector

For CAT5 Raritan Connector

For CAT5 Ethernet Connectors

Figure 4. SDLS/CAT5e Mounting Plate